

Game on for health: designing gamified campaigns to drive behavioral change

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Article Info

Article history:

Received Nov 16, 2024

Revised Oct 7, 2025

Accepted Nov 3, 2025

Keywords:

Behavior change

COVID-19

Gamification

mHealth

User perception

ABSTRACT

An awareness campaign aims to reach out to the public, measure the outreach accurately, and motivate the public to act. In other words, awareness campaigns deliver messages on the importance and effects of the promoted event to the audience. However, studies that examine the users' perception of design for behavior change through gamified health awareness campaigns are limited, especially in combating the coronavirus disease 2019 (COVID-19) outbreak. Subsequently, analysis of such perceptions is crucial in supporting game designers in developing engaging games for health awareness campaigns. Thus, the current study explores users' perceptions based on elements in the GAMEBC Model: Autonomy, Relatedness, Competence, and Engaging. A total of 180 students from UiTM Cawangan Melaka (UiTMCM), Jasin Campus, participated in the study. The data was evaluated using conventional descriptive statistical methods. The findings revealed users' perceptions of the design for behavior change in the context of a gamified health awareness campaign. The study offers a valuable understanding of the necessity of creating a comprehensive gamified campaign that promotes behavioral change for improved quality of life.

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1. INTRODUCTION

In December 2019, the world was struck by the onset of the coronavirus disease 2019 (COVID-19) pandemic [1]. In relation to this, the Malaysian government played an essential role in keeping Malaysia safe from the pandemic. To describe the virus's appearance, it has crown-like spikes on its outer surface, which were then named coronavirus (COVID-19) [2], [3]. COVID-19 is believed to be widely infecting animals, such as cats, camels, bats, dogs, and other mammals. It is also one of the pathogens that infect a human's respiratory tract [4]. Before the disease was officially declared a pandemic, the first recorded human infection was documented in Wuhan, China, in late 2019 [5].

The societal challenge faced whenever a problem happens is maintaining awareness. Since the new everyday practices are technically new to most Malaysians, the society could not adjust well to this new lifestyle. Commonly, people's awareness of COVID-19 and the precautionary suggestions for COVID-19 are spread through media outlets, especially news reports, facts, and information about the disease. From the information obtained, people's perceptions of threats impacting their health will dictate the preventive measures. By keeping themselves aware, people will take precautionary steps and preventive measures. Disseminating knowledge regarding the causes, viral transmission, and preventive measures is of utmost

importance in mitigating the spread of COVID-19 [6], [7]. The willingness to follow self-quarantine, refrain from participating in public activities, and reschedule social events is a fundamental comprehension of the COVID-19 pandemic [8]. Awareness is an essential factor that affects compliance. Past research indicates that older individuals possessed higher disease awareness, as seen by their knowledge of self-protection methods. Furthermore, a positive correlation exists between age and awareness of COVID-19 [9].

The COVID-19 pandemic has significantly impacted global health and behavior, necessitating innovative strategies to promote behavioral change. Traditional methods of disseminating health information often struggle to engage audiences effectively, especially younger generations. Gamification, which integrates game mechanics into non-game contexts, has emerged as a promising approach to increase engagement [10]. However, studies explicitly examining user perceptions of gamified health awareness campaigns, particularly those targeting behavior change during the COVID-19 pandemic, remain limited. This gap highlights the need for further exploration into how gamification can be optimized to drive behavioral change effectively.

2. BACKGROUND STUDY

2.1. Health awareness campaign

A health awareness campaign aims to reach the public, measures that outreach accurately, and motivate them to act for a better quality of life. In other words, health awareness campaigns deliver messages on the value of health and its impact on people, such as those related to COVID-19. Generally, people worldwide are well informed regarding COVID-19. This information was delivered daily via media, news, and rule implementations [11]. Daily updates and news regarding COVID-19 and the vaccination programs have been reported. However, are people aware of all the precautions and preventions? A study by [12] stated that employed people were more aware of the virus than non-working people. Hence, providing people with a thorough insight into the COVID-19 pandemic is imperative. However, people must be vigilant and conscious of their present well-being and the continuing consequences of the epidemic on their personal and professional circumstances [13].

2.2. Gamification

Games create engagement, which is necessary for any learning experience [14], [15]. Gamification incorporates game-like features into daily experiences such as shopping, using a handwriting program, or learning science. A recent research movement called gamification aims to apply elements of game design to non-gaming contexts, such as education and training [16], [17]. Gamification primarily aims to boost user engagement and transform non-gaming environments into visually appealing and enjoyable environments. Additionally, gamification implements game design principles, mechanics, and game thinking to increase motivation in non-gaming activities [18].

Recently, several studies have been done on the gamified system. Previous studies have shown that learning behavior benefits learning performance and motivation [11]. Furthermore, gamification transforms the learning process into a game-based world [19]. As people tend to lose focus when reading or watching something long time, gamification will make learning more enjoyable. It is also important to remember that using a game in a non-gaming environment requires engagement [20]. Besides, gamification combines game mechanics with gameplay and then implements them to present learning content to motivate players' engagement [15]. Furthermore, business areas have largely embraced gamification elements to enhance employees' experience through rewards, leaderboards, and badges [21]. Gamification received a significant endorsement from researchers and educators who acknowledged that gamification improves productivity and fosters creative exploration among learners [22], [23].

2.3. Gamified health awareness campaign

Game-based activity is defined as an individual engagement for entertainment. Games are fundamental in human interaction and learning. It is one of the best platforms to educate people. People who play games have an excellent opportunity to learn practical skills. Nowadays, games are created for educational purposes, which have created awareness for people in an enjoyable experience. It is an alternative that makes people pay attention to specific subjects. Through gamification, people will become more attracted to learning as it stimulates and creates engagement [24]. Health awareness campaigns through gamification increase society's understanding of the campaign's content. A previous study by [25] investigated Gen Z's insight into gamified health awareness campaigns against the COVID-19 pandemic. Identifying the challenge of gamified health awareness also serves as a blueprint for creating an application to fight the COVID-19 pandemic. Additionally, a study by [22] discussed improving knowledge of infection prevention and control procedures (IPC) and COVID-19 safe practices. The study also determined a serious game called 'Escape COVID-19' to improve compliance with the COVID-19 safe rules and modify the intention to follow IPC guidelines among nursing home employees.

Furthermore, past research has examined the efficacy of health games as a technological tool for promoting health through anti-smoking initiatives and advertising. For example, a study by [26] examined the effects of voice-over and various anti-smoking advertising messages on first-person shooter (FPS) games. The study showed how video games can be used to support anti-smoking campaigns. In the video game, a player can understand the harmful effects of smoking cigarettes and how it affects their health. Moreover, gamification is beneficial for an awareness campaign as it helps deliver the message and purpose [27], [28]. Additionally, a gamified health awareness campaign stimulates interest in learning and improves people's understanding and attention to the campaign's content via user engagement. Thus, gamification can be implemented as an exciting approach to motivate people to learn.

2.4. Key contribution of the gamified health awareness campaign

Several key contributors have advanced their understanding of gamification and its role in promoting engagement and behavioral change. A study by [29] introduced the concept of gamification, emphasizing its potential to increase motivation by integrating game mechanics into non-game contexts. Besides, a study by [17] conducted a comprehensive review, highlighting gamification's effectiveness in enhancing learning and behaviour when designed thoughtfully. In health campaigns, Al-Azawi *et al.* [19] demonstrated how gamification improves user engagement compared to traditional educational methods. Lu and Ho [24] extended this understanding by showing the role of gamification in enhancing user engagement, mainly focusing on how gamified elements can influence sustainable behaviour in digital applications. In the context of COVID-19, [11] developed the GAMEBC model, showcasing its ability to engage Gen Z audiences in health awareness campaigns. Yoo and Eastin [26] further emphasized gamification's potential in health promotion by demonstrating how storytelling and interactive game elements effectively enhance health-related messages, such as anti-smoking campaigns. Together, these studies underscore the importance of gamification as a tool for fostering engagement and behavioral change in diverse contexts.

3. METHOD

3.1. Criteria for participation

This study involved 180 undergraduate students from the College of Computing, Informatics and Mathematics (KPPIM), UiTMCM, Jasin Campus, who fulfilled the inclusion criteria. The participants must have experience playing computer games as beginners, moderates, or hardcore gamers. The participants were also requested to complete a consent survey for this research procedure. Confidentiality and anonymity were strictly maintained throughout the study.

3.2. Instrument

Table 1 shows a self-administered instrument adapted based on the GAMEBC Model [17]. The GAMEBC Model is a questionnaire concerning the proposed design criteria for behavior change, which involves Autonomy, Competence, Relatedness, and Engagement elements. The respondents were expected to specify their agreement with the items related to the perception of design for behavior change through a gamified health awareness campaign. Each component was measured through a set of structured items using a five-point Likert scale ranging from strongly disagree to strongly agree. The instrument underwent a validity assessment and was adapted from prior studies to ensure its reliability and relevance to the context of gamified health awareness campaigns.

3.3. Procedure

The process of distributing to respondents through an online platform involves several key steps to ensure effective data collection. First, the target audience is identified, ensuring they align with the research objectives. The survey is then designed using the user-friendly online platform (JotForm) with clear questions tailored to the respondents' literacy level, and can be accessed across devices. The use of JotForm for data collection ensured accessibility, especially during a pandemic when in-person surveys were impractical. The survey link is shared via social media to reach respondents conveniently. Reminders are sent periodically before the deadline to enhance participation. Throughout the distribution period, response rates are monitored using the JotForm platform's analytics. Ensuring data privacy and informed consent are prioritized and encouraging honest responses. This systematic approach maximizes reach and collects high-quality data efficiently. The descriptive statistical methods were selected for their suitability in summarizing perceptions and deriving meaningful insights from the data. By employing the GAMEBC model, the study addresses the need for a structured framework to evaluate gamified elements in health campaigns.

Table 1. GAMEBC model item

Items	Code	Item	Items	Code	Item
Autonomy	A1	I can create a customization profile.	Relatedness	R1	I can be involved in social interactions.
	A2	I can choose the activity in the game.		R2	I can share the information through social interaction.
	A3	I can control interaction in the game.		R3	I can join the game community.
	A4	I can control the interface game.		R4	I have experienced various types of social interactions.
	A5	I have a sense of control over the game.		R5	I feel cooperative toward other users.
	A6	I freely play the game the way I want.		R6	I can collaborate with other users.
Competence	C1	I have different levels of challenges.	Engagement	E1	I feel a state of curiosity.
	C2	I have received feedback on the progress.		E2	I feel a state of flow in the gameplay.
	C3	I can refer to the performance bar.		E3	I feel an intense sensation of success.
	C4	I have a badge as a reward for achievement.		E4	I understand the game content.
	C5	I can get the point as a reward system.		E5	I feel a positive emotion in a learning experience.
	C6	I can refer to the leaderboard.		E6	The game is compliant with the treatment.

4. RESULTS AND DISCUSSION

4.1. Demographic respondents

Table 2 shows the demographic results of the respondents. More than half of the respondents were females, with N = 108 (60%). Most respondents were between 22 and 25 (63.3%), while 35.6% were between 18 and 21. For education level, 40 (22.2%) of the respondents had a diploma, while one respondent was pursuing a postgraduate study. 68 (37.8%) of the respondents played video games every day, 19 (10.6%) of the respondents played digital games once a week, and 41 (22.8%) of the respondents played more than once a week. In regard to their gaming level, a total of 116 (64.4%) respondents considered themselves moderate gamers. In comparison, 50 (27.8%) of them claimed to be at a beginner level, and 14 (7.8%) claimed to be hardcore gamers. As for the residential area, a total of 124 (68.9%) respondents lived in urban areas, while 56 (31.1%) lived in rural areas.

Table 2. Demography result

Questions	Range	n	%
Gender	Male	72	40
	Female	108	60
Age	18-21 years old	64	35.6
	22-25 years old	114	63.3
	26-29 years old	1	0.6
	More than 29 years old	1	0.6
	Diploma	40	22.2
Education level	Degree	139	77.2
	Postgraduate	1	0.6
	How often do you play the digital game?	68	37.8
How often do you play the digital game?	Everyday	19	10.6
	Once a week	41	22.8
	More than once a week	14	7.8
	Once a month	13	7.2
	More than one in a month	7	3.9
	One in half-year	5	2.8
	More than once in a half-year	6	3.3
	Once a year	7	3.9
	I try to play the game as rarely as possible	50	27.8
	Beginner	116	64.4
Experience level as a gamer	Moderate	14	7.8
	Hardcore	56	31.1
	Where do you reside (live)?	124	68.9
Where do you reside (live)?	Rural area (Countryside)		
	Urban area (Town/City)		

4.2. Design for autonomy element

Figure 1 shows that 28.3% of respondents were neutral and 45.6% agreed with the proposal to create a customized profile. 81.7% of respondents either agreed or strongly agreed that the game should provide options for players to choose their activities. It was also found that 86.1% of the respondents wanted to control the game's interactivity and 65% wanted to control the game's interface. 79.5% of the respondents agreed and

strongly agreed that the game should give the player a sense of control. Besides, 82.2% of the respondents agreed strongly agreed that the player should be able to play the game freely as they prefer.

These findings emphasize the importance of providing users with a sense of control, aligning with [30], self-determination theory, which identifies Autonomy as a key motivator in behavior change. When compared with prior research, these findings align with [24], who emphasized autonomy as a driver of engagement in gamification. Additionally, Koivisto *et al.* [17] demonstrated how autonomy elements in gamification significantly enhance user motivation. This study extends these findings by focusing on autonomy within health awareness campaigns. A limitation is the potential overemphasis on customization, which might not universally apply across diverse demographics.

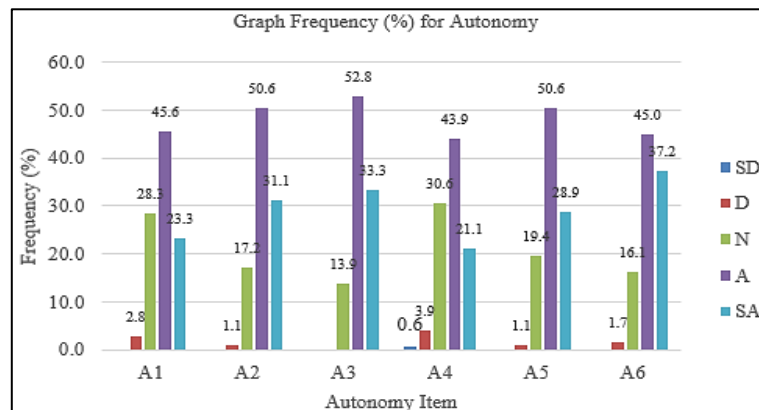


Figure 1. Graph frequency (%) the perception of design for the autonomy element

4.3. Design for competent element

Figure 2 shows the respondents' perception of the design for the competent element. It is shown that 85% of the respondents agreed to strongly agreed that gamified campaigns should have different levels of challenge. 70% of them also agreed to strongly agreed that users should receive feedback to be aware of their progress while playing the game. Moreover, 79.4% of the respondents agreed to strongly agreed that the performance bar should be included to track user performance progress. It was also found that 70.4% of the respondents agreed and strongly agreed that an achievement badge should be provided, and 80.5% of the respondents agreed and strongly agreed that points should also be included as a reward system for achievement to boost motivation for the user.

Koivisto *et al.* [17] also highlighted the importance of feedback and challenges in gamification to sustain motivation. However, this study emphasizes competence as a driver of behavior change, specifically in gamified health campaigns. A key strength of this study is its application of competence to public health challenges like COVID-19, but a limitation lies in the absence of longitudinal data to evaluate sustained effects.

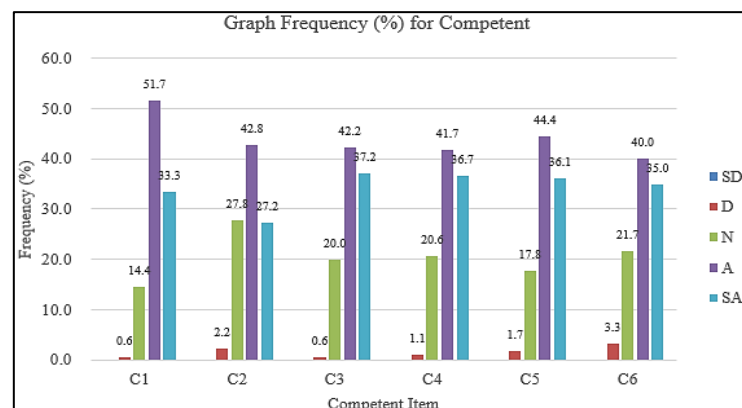


Figure 2. Graph frequency (%) of the perception of design for the competent element

4.4. Design for relatedness element

Figure 3 presents the data of the Relatedness element. The data shows that 72.3% of the respondents agreed to strongly agreed that they can interact on social networks while using the game. Besides, the respondents could share information through social networks. In addition, it was also proven that 72.8% of the respondents agreed to strongly agreed with the statement. Regarding community connection, 73.9% of the respondents strongly agreed that they could join the community while playing the game. Furthermore, in terms of experience and cooperation, 71.7% of the respondents could feel the various types of social interaction and cooperation with other players. Finally, 72.8% of the respondents agreed to strongly agreed that they could collaborate with other players during the game.

These findings are consistent with [31] work, which emphasized the role of relatedness in fostering a sense of community and connection in gamified applications. This study expands these insights by confirming the relevance of relatedness in health awareness campaigns. A limitation is that relatedness may resonate differently with individuals who are less socially inclined.

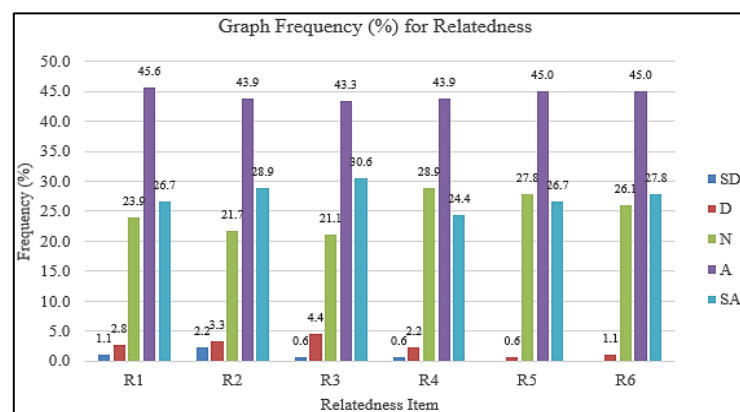


Figure 3. Graph frequency (%) perception of design for the relatedness element

4.5. Design for engagement element

Recently, gamification has become increasingly popular among professionals and researchers to incentivise, involve, and improve consumer participation and loyalty within a particular brand or community [32]. Generally, gamification utilises game components and design principles in a non-game context. Figure 4 depicts the respondents' perception of the design concerning the Engaging element. According to the findings, 51.7% of the respondents agreed, and 33.3% strongly agreed that they had a sense of interest. Regarding the state of flow in the gameplay, 42.8% of the respondents agreed with this statement, while 42.25% felt an intense sensation of success. Almost half of the respondents, 75 (41.7%), understood the game content, and 80 (44.4%) stated that they felt a positive emotion in a learning experience. Besides, 40.0% of the respondents reported that the game complies with treatment.

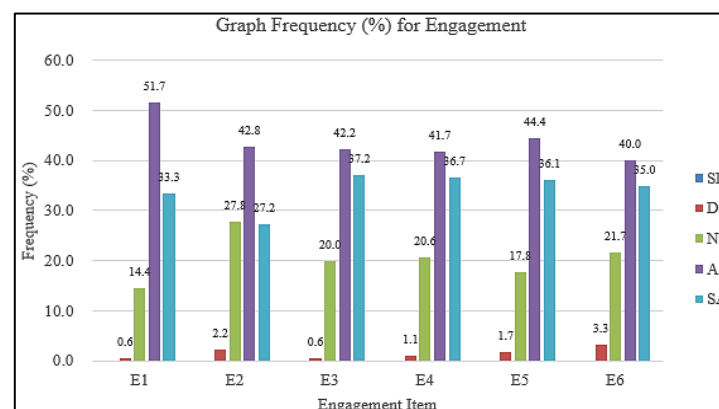


Figure 4. Graph frequency (%) of the perception of design for the engagement element

This aligns with Lu and Ho [24], who found engagement to be a key driver of user retention in gamified applications. This study builds on these findings by linking engagement to behavioral change in health awareness campaigns. Strength is the study's comprehensive evaluation of engagement within the GAMEBC model, though engagement ratings might vary based on game complexity and participant gaming experience.

5. CONCLUSION

This study seeks to examine how design can effectively promote behavior change through a gamified health awareness campaign aimed at addressing the challenges posed by the COVID-19 pandemic. Besides, this study highlights the critical role of autonomy, competence, relatedness, and engagement in gamified health awareness campaigns. By addressing these elements through the GAMEBC model, gamified interventions can effectively promote behavioral change. These findings are particularly relevant for public health challenges where innovative strategies are required to enhance awareness and compliance. Based on this study, future related studies may consider undertaking criteria design for behavior change through a gamified health awareness campaign. The results of the present study emphasized that the combination of gamification design and health awareness campaigns stimulates an engaging experience

FUNDING INFORMATION

This research was funded by the Ministry of Higher Education Malaysia under the Fundamental Research Grant Scheme (FRGS), award number FRGS/1/2021/ICT10/UITM/02/2.

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